Mobility of people with lower limb amputations

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Mobility of people with lower limb amputations: scales and questionnaires: a review

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Objective and design: A systematic literature review to compare mobility scales used for lower limb amputees. A literature search was carried out by computerized search of biomedical literature including Medline and Embase. The studies included were published between 1978 and 1998 and including the following keywords: amputation, artificial limbs, prosthesis, lower limb, activities of daily living, mobility.
Results: Thirty-five studies were identified; 19 had a measurement of separate levels of mobility comparable to each other. Sixteen studies used ordinal and ratio scales without separate levels of mobility. The widest range of measurement found was the scale from 'walking with prosthesis without a walking aid' to 'totally confined to bed'. The Stanmore Harold Wood mobility scale was published most frequently. None of the 35 studies presented give a continuous measurement of mobility.
Conclusion: A multitude of measurement scales and questionnaires are available for differ in methods and measuring range. Measuring mobility by a scale has been shown to have limitations. Several authors did extensive research but they all measure only a number of aspects of mobility. Consensus about the measurement of mobility of lower limb amputees is not available in the recent literature.

Introduction

In the Netherlands and Northern Europe, over 90% of all lower limb amputations are performed for the treatment of vascular occlusive disease; about 45% of these lower limb amputations are related to diabetes mellitus.[1,2] About 80% of the patients are over 60 years of age and have more or less co-morbidity in vascular, respiratory and neurological disease.[1–4] The key to independence for this group is their walking ability and their ability to move in and around their homes.[3] Limited indoor walking ability allows transfers from wheelchair to bed or toilet facilities to ensure independence and self-esteem. Limited outdoor walking ability gives the amputee the possibility of taking part in social activities in the local community. It includes transfers from wheelchair into transport facilities, taking ramps and uneven pavements.

Analysis of the available mobility instruments in this field is essential to compare results of the

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rehabilitation treatment for this growing group of amputees. A multitude of measurement scales and questionnaires are available but they differ in methods and measuring range. A systematic review of these instruments gives an overview of the mobility scales used and will produce guidelines for the best mobility scale for rehabilitation treatment.

Our primary goals in this study are:

1) to give a review of different mobility scales for lower limb amputees in the studied literature; and
2) to compare the range of measurement of the mobility scales.

Methods

A complete literature search on Medline from 1978–1998 and on Embase from 1988 to 1998 was carried out. For the search, we used the keywords: amputation, artificial limbs, prosthesis, lower limb, activities of daily living, mobility, questionnaire and combinations of these topics. Review articles found were also checked in the database and included in the search.

The selected summaries were classified according to the following data:

1) A measurement scale for mobility of lower limb amputees.
2) Publication period between 1978 to 1998.
3) Use of walking aids stated.

The studies presented were reviewed in order to analyse the mobility scales used. The mobility scales included performance in locomotion as well as walking distance and walking speed. Measuring mobility of lower limb amputees was related to the use of walking aids as this is an item frequently used to measure mobility at home after rehabilitation treatment. Personal communication with several authors was used to classify several walking aids not mentioned in the questionnaires. Several studies combined measurement of mobility together with questionnaires used to get additional information of prosthetic use and independence in ADL.

Inventory regarding mobility

Table 1 compares the studies published from 1978 onwards. In Table 1a[6–9,11–25] studies using mobility scales with distinct qualitative levels of mobility are given (e.g. walking without an aid, with help of a crutch or frame, or wheelchair use). In Table 1b[26–41] studies using scales with ordinal scores are given (e.g. walking outside the house, community walker, carry out several household activities, driving a car, etc.).

The columns in Table 1 are as follows:

- *Population* The total number of patients included in the study. This in order to follow correctly the 'intention-to-treat principle' at the start of the study. Most studies showed results for a selected population, for example, patients fitted with a prosthesis only.
- *Age* The age of the participating patients was recorded if this was stated in the original study.
- *Amputation* level The amputation level is given according to the rules of the International Society for Prosthetics and Orthotics (ISPO) consensus conference in 1990.[42] Bilateral amputees are often of several amputation levels and only a few studies[6,13] gave a separate description of this group. In most studies results for unilateral and bilateral amputees were put together.
- *Reason amputated* The cause for amputation is given according to the description in the original publication.
- *Mobility scale* The mobility scale described is given with the distinct ordinal levels of mobility. If a ratio or interval score is used for time, walking speed or distance, it is noted separately. In an ordinal scale, it is stated that items in the scale stand in some kind of relation to each other. There is no true zero point and the intervals between the items are not equal. The scales are presented in their original form and if an author used a scale of another author, this is stated separately.
- *Questionnaire* This gives information about the use of a questionnaire in order to collect information about mobility items in the studies separately from the mobility scale. To measure mobility, several studies used the Barthel index[5] together with Russek's classi-

Table 1 Mobility scales compared in the study

Author	Population	Age	Amputation level	Reason for amputation	Mobility scale	Questionnaire	Use of aids	Stairs
(a) Studies using mobility scales with distinct qualitative levels of mobility								
Volpicelli[6] (1983)	103	29–94	Bilateral	Vascular, diabetes, trauma	Ordinal 6 levels	–	Crutch, crane, walker, wheelchair, bed	+
Narang[7] (1984)	500	2–90	TF, KD, TT	Trauma, illness	Ordindal 5 levels	+	Crutch, wheelchair, no prosthesis	–
Helm[8] (1986)	257	38–95	TF, TT bilateral	Vascular, diabetes others	Ordinal 4 levels		Crutch, frame, wheelchair, no prosthesis, cosmetic	–
Kullman[9] (1987)	452	8–90	Not given	Vascular diabetes, tumour, others	Ordinal 5 levels[b]	+	Not given	–
Stern[11 a] (1988)	238	mean 66	TF, TT, bilateral	Vascular, diabetes	Ordinal 5 levels[b]	–	Crutch, walker, no prosthesis	–
Pinzur[12] (1988)	46	Not given	KD	Vascular, diabetes	Ordinal 6 levels	–	No	–
Wolf[13] (1989)	18	55–83	Bilateral TF/TT	Vascular	Ordinal 8 levels	–	Walking aids, wheelchair, assistance	–
Siriwardena[14] (1991)	598	50–70+	TF, KD, TT	Vascular	Ordinal 6 levels	–	Crutch, frame, wheelchair	–
Pohjolainen[15] (1991)	155	14–87	TF, TT	Vascular, tumour, trauma	Ordinal 7 levels	+	Crutch, frame, wheelchair, no prosthesis	–
Hanspal[16] (1991)	100	60–89	TF, TT	Not given	Ordinal 6 levels	+	Crutch, stick, frame wheelchair, cosmetic, assistance	–
Hepp[17] (1991)	198	Mean 63	85% unilateral 15% bilateral	Vascular	Ordinal 7 levels	–	Crutch, wheelchair, no prosthesis, bed	–
Houghton[18 a] (1992)	440	39–90	TF, TT, GS, KD bilateral	Vascular	Ordinal 6 levels[c]	+	Crutch, stick, frame wheelchair, cosmetic assistance	–
Datta[19 a]	41	31–84	Bilateral	Vascular, diabetes, trauma	Ordinal 6 levels[d]	–	Crane, crutch, walker, wheelchair	+
Zijp[20] (1992)	61	38–91	Not given	Not given	Ordinal 3 levels	–	Crutch, frame, wheelchair	–
Lachman[21 a] (1993)	11	40–82	TF, TT	Vascular, infection, artroplasty	Ordinal 6 levels[c]	–	Crutch, stick, frame wheelchair, cosmetic, assistance	–
Campbell[22 a] (1994)	210	43–96	TF, TT, GS	Vascular	Ordinal 6 levels[c]	–	Crutch, stick, frame, cosmetic	–
Johnson[23 a] (1995)	120	25–89	TT	Vascular, trauma	Ordinal 6 levels[d]	+	Crutch, cane, walker, wheelchair, bed	–
Kanellopoulos[24 a] (1996)	93	42–93	TF, TT bilateral	Vascular	Ordinal 6 levels[c]	+	Crutch, stick, frame wheelchair, cosmetic, assistance	–
Burger[25] (1997)	519	Mean 54,4	HD, TF, KD TT	Trauma	Ordinal 3 levels	+	Crutch, cane, wheelchair	+

(b) Studies using mobility scales with ordinal scores

Kegel[26] (1978)	134	10–90	TF, TT bilateral	Vascular, trauma, tumour, congenital	Ordinal score	+	Crutch, frame, wheelchair	+
Day[27] (1981)	2400	Not given	Not given	Not given	Ordinal score	+	Walking aid, wheelchair	+
Steinberg[28] (1985)	114	65+	TF, TT bilateral	Not given	Ordinal score 3 levels	–	Crutch, cane, wheelchair, cosmetic	–
Beekman[29] (1988)	55	Mean 65,4	TF, TT	Diabetes, other causes	Ordinal score ratio scale: time walking speed interval score: distance	+	Crutch, cane, walker, wheelchair	+
Lavan[30] (1988)	146	65+	TF, TT bilateral	Vascular, other causes	Ordinal score	Clinical investigation	Not given	+
Chan[31] (1990)	47	65+	TF, TT, TM, bilateral	Vascular, tumour, trauma, diabetes	Ordinal score	+	Not given, cosmetic	–
Brodzka[32] (1990)	24	54–95	Bilateral TT–TT	Vascular	Ordinal score	Telephone interview	Crutch, frame, wheelchair	–
Collin[33] (1992)	40	50–81	TF, TT, bilateral	Vascular, diabetes	Ordinal score ratio scale: time	+ home visit	Not given except wheelchair use	+
Hagberg[34] (1992)	59	50+	TF, KD, TT	Vascular and other reasons	Ordinal score	+	Crutch	+
Nissen[35] (1992)	46	42–95	TF, TT bilateral	Diabetes and others	Ordinal score index measure	+	Wheelchair and other sources	–
Walker[36] (1994)	114	2–67	HD, TF, TT, TM, bilateral	Trauma	Ordinal score, interval score: distance	+	Not given	+
Gauthier-Gagnon[37] (1994)	89	24–87	TF, TT	Vascular, diabetes, tumour, trauma	Ordinal score, interval score: distance	+	Crutch, cane, frame	+
Sapp[38] (1995)	132	23–85	TF, TT	Not given	Not given	+	Cane, quad cane, crutches, walker	–
Datta[39] (1996)	53	60–80	TF, TT	Vascular, diabetes, trauma	Ratio scale: time	+	Walking aids	–
Legro[40] (1998)	114	20–87	TF, KD, TT, Syme	Vascular, tumour, trauma, congenital	Visual analogue scale prosthesis evaluation quest	+	Not given	–
Traballesi[41] (1998)	144	mean 68 ± 10	TF	Vascular, diabetes	Ordinal score Rivermead Mobility Index	+	Walking aids	+

Amputation level: HD, hip disarticulation; TF, transfemoral; KD, knee disarticulation; TT, transtibial; GS, Gritti Stokes; TM, transmalleolar.
[a]Refers to a scale previously used by another author as stated.
[b]Based on scale of Russek (1961).[10]
[c]Based on scale of Hanspal and Fisher (1991).[16]
[d]Based on scale of Volpicelli *et al.* (1983).[6]

fication,[10] the Nottingham extended ADL index,[3] or the Frenchay Activity Index.[39]

- *Use of aids* The walking aids used for measurement of the mobility scale or stated in the questionnaire are given. If the item activity with or without a prosthesis is stated, this is especially noted, since mobility without a prosthesis for self-care is of vital importance for individual ADL.
- *Stairs* The item 'climbing stairs' is especially noted if included in the questionnaire since climbing stairs is one of the most demanding tasks for the lower limb amputee and is therefore noted separately.

Table 2 gives an overview of the range of measurement of the different mobility scales as given in Table 1a.[6–9,11–25] In order to give good comparison we used the study by Siriwardena and Bertrand[14] to classify the different mobility scales. This Walking Ability Index (WAI) scale was designed to measure the ability of the amputee to cross a distance of 10 feet (3 metres) in an ordinary room with the use of walking aids if necessary. The amputee shows a normal moving pattern, as practised at home. WAI 1 is fully mobile with a prosthesis and normal walking pattern. WAI 2 is fully mobile with a prosthesis and an abnormal walking pattern, but without any walking aid. WAI 3 is mobility with one cane or crutch. WAI 4 is mobility with two canes or crutches. In this item, we also included a delta roller or a rollator. WAI 5 is mobility with a frame. WAI 6 is unable to cross the 10 feet other than with a wheelchair. The advantage of this scale is that it covers the actual performance and not what the amputee could or should perform at maximum endurance.

In Table 2 the first line shows the continuous line of mobility of an amputee from fully mobile with a prosthesis without a walking aid towards completely bedridden without a prosthesis. This is a continuous line without intervals or subclasses. The second line shows the individual items of the WAI by Siriwardena and Bertrand.[14] After WAI 6 (wheelchair use) Pinzur *et al.*,[12] Wolf *et al.*[13] and Hepp *et al.*[17] include items towards wheelchair use with assistance and an item 'fully bedridden'. Because there was no actual use of the prosthesis we included these items in a seventh class at the end of the continuum (Bed).

The list of authors is in the same sequence as in Table 1. Because the study of Siriwardena and Bertrand is chosen as an inventory for the other studies, we put it at the top of the list.

Some authors used the classification as used in the WAI and are put together in the same line of the table. Others used the scale used by Volpicelli *et al.*[6] or Russek[10] and are put together in the same line as the original author. The original numbering of the scales by the different authors was in sequence of 1–6 upwards, with best mobility grade 1 to worst mobility grade 6; or 3–1 or 6–1 downwards with best mobility grade 6 to worst mobility grade of 1 in the individual studies. In order to give a clear overview, the individual scale gradations are replaced by dots. The dots are placed in the corresponding classes related to the WAI.

After WAI 6 (wheelchair use) Wolf *et al.*,[13] Pinzur *et al.*[12] and Hepp *et al.*[17] include items towards 'wheelchair use with assistance' and an item 'fully bedridden'. The total panorama of mobility from 'fully mobile' with a prosthesis towards 'totally confined to bed' is covered.

In the scales without the specific use of walking aids, as in Pinzur *et al.*,[12] Wolf *et al.*[13] and Hepp *et al.*[17] there is a sliding mobility scale. There is no sharp distinction between the subclasses possible towards the classes defined by the WAI. Therefore we also used the subclasses in order to cover the actual mobility range as given by the mentioned studies. It gives valuable information about the mobility of lower limb amputees and is therefore included. As we stated earlier in the qualitative analysis section the scales comprise ordinal scaled classes. All 12 scales but one[8] start with the item 'mobility without a walking aid' and all studies include class VI 'mobility with a wheelchair' at the right-hand end of the range of measurement.

Qualitative analysis

In order to analyse the different studies in a qualitative way we compared the studies in Table 1. We tried to find a mobility scale with a maximum scale range and the best detail in measuring the separate levels of mobility of lower limb amputees. The inventory of the literature showed

Table 2 Comparison of scales working towards a continuous mobility scale from fully mobile with a prosthesis without walking aid towards totally bedridden

Fully mobile with prosthesis ---------- Bedridden																						
	No aid normal walking				No aid abnormal walking				1 cane/crutch				2 canes/crutches				Walker frame				Wheelchair				Bed
Siriwardena[14]	I				II				III				IV				V				VI				
Volpicelli[6]	•								•						•		•	•			•				
Johnson[23]/Datta[19]																									
Narang[7]	•								•		•		•								•				
Helm[8]							•				•		•					•							
Russek[10]	•		•		•				•								•				•				
Kullman[9]/Stern[11]																									
Pinzur[12]	•								•		•		•				•				•				•
Wolf[13]	•				•				•								•		•		•		•		•
Pohjolainen[15]	•				•		•				•		•				•		•		•				
Hanspal[16]	•						•				•		•						•		•				
Lachmann[21]																									
Campbell[20]/Houghton[18]																									
Kanellopoulos[24]																									
Hepp[17]	•		•		•				•				•		•						•		•		•
Zijp[20]	•				•				•				•				•				•				
Burger[25]	•				•				•				•								•				

studies with seven levels of mobility[12,13,17] as the widest measuring range. This covered the full range of mobility from 'fully mobile with an artificial limb without aids', to 'totally confined to bed'.

In order to add detail between these seven levels of mobility we subdivided the seven classes into six subclasses. This enabled us to refine the table and to include more detailed descriptions of the mobility items used in the scales studied.

Since all the scales were ordinal, we spaced the classes equally. In this way we were able to compare the measuring range of the individual studies.

In our opinion, by conducting this qualitative analysis, we give a reliable synopsis of the measurement scales studied.

Reliability and validity

The scales all measured mobility of lower limb amputees. None of the studies studied the inter- or intra-observer reliability. Test–retest reliability was carried out in several studies. Measurements were performed several times on the same artificial limb users over time. This recorded any change in mobility over time with the same mobility test.

The construct of a seven-class instrument for measuring mobility was designed because no adequate measurement scale existed that covered the wide range of mobility of artificial limb users.

None of the studies used statistical analysis to compare the mobility measurements used in the studies.

Results

We found 35 studies in recent literature between 1978 and 1998 (Table 1).

The population studied varies considerably. Nine of the studies (25%) included more than 200 patients, with a range of 210–2400. As expected, most studies have a majority of elderly vascular amputees. Studies including trauma or tumour amputees have a wider age range and include more people under 60 years of age. Almost all studies include transfemoral (TF) amputees. The study by Pinzur[12] focuses primarily on knee disarticulation (KD) amputees. This amputation level is also included in the studies by other authors.[7,14,24,25,34,40] Special studies including all amputation levels in the lower limb are limited: only the study by Walker *et al.*[36] includes all amputation levels. Two studies focus on bilateral amputees only.[6,19] Nineteen studies[6–9,11–25] give separate levels of mobility. The scales have distinct levels of measurement and are ordinal scaled.[43]

Several authors[9,11,13,19,21–25] use a scale previously used by other authors. Datta *et al.*[19] and Johnson *et al.*[23] also use the scale by Volpicelli *et al.*[6] Datta *et al.* used the same classification but defined walking distance in feet instead of using the original item – walking blocks. Pohjolainen and Alaranta[15] used the scale designed by Narang *et al.*[7] but extended it with two categories to identify indoor and outdoor mobility. In the study by Kullmann[9] as well as the scale used by Russek,[10] a Barthel score was used to measure ADL. If the original Russek score was used, only four items of the Barthel score could be found. The study by Hanspal and Fisher[16] used the Stanmore Harold Wood mobility scale, later used by several other authors in the UK.[18,21,22,23] 'Using stairs' is included in the scale developed by Volpicelli *et al.*,[6] and used by Datta *et al.*[19] and Johnson *et al.*[23]

Table 1b[26–41] gives an overview of the mobility of lower limb amputees without a distinct scale measuring mobility. This is done a less specific way than in the previous studies of Table 1a. In the questionnaires, items about mobility are often included. For example, questions used may include the number of hours of prosthetic use, walking speed and time to reach a specific distance or a visual analogue scale (VAS) to measure walking possibilities.[40] This gives information about mobility but is not comparable with the previously mentioned scales.[6–9,11–25] Traballesi[41] used the Rivermead Mobility Index.[48] This scale is used to measure mobility but was developed for patients with head injury and stroke and not for artificial limb users.

Climbing stairs with a prosthesis is a demanding task and in the Barthel Index[5] this is the final and most demanding item. In 14 studies[3,6,25–27,29,30,32–34,36,38,41] this item is included, but only Volpicelli *et al.*[6] used this item in the measurement scale for mobility. The other studies

inquired about this item in the additional questionnaire or in the ADL index.

Table 2 compares range of mobility measured by the studies.[6–9,11–25] All but one study start with normal walking without walking aids (WAI I). The study by Helm *et al*.[8] starts with the item: 'Patient wears prosthesis all day, walks alone even outdoors. At times uses one cane outdoors but not indoors. Does not use a wheelchair'. We therefore put the dot in between class II and III. Russek[10] and Hepp *et al*.[17] use the item: 'Walk with prosthesis with a walking aid', but not stating the quality of walking. We therefore included an extra dot in between I and II. To include the item: 'Use of wheelchair with assistance' we put an extra dot between WAI VI and 'Bed'.[6,13,15,16,18,21,22,24]

In the most extensive used scale by Hanspal and Fisher[16] and others[18,21,22,24] for the item 'Wears prosthesis only for transfers or to assist nursing; walks only with a carer', an extra dot is placed in between WAI V and VI.

Discussion

This study gives an overview of mobility scales for lower limb amputees. A complete literature search of the electronic literature databases Medline (from 1978 to 1998) and Embase (from 1988 to 1998) was carried out.

Our primary goals in this study were: (1) to give a review of different mobility scales for lower limb amputees in the studied literature and (2) to compare the range of measurement of the mobility scales. Table 1 gives the review of the literature between 1978 and 1998 and Table 2 shows the different ranges of measurement of the individual scales studied. The scales by Pinzur *et al*.,[12] Wolf *et al*.[13] and Hepp *et al*.[17] had the widest ranges of measurement.

The study of Hanspal and Fisher[16] used the Stanmore Harold Wood mobility scale. Several other authors in the UK[18,21,22,24] used this scale, and it was (with five publications) the most frequently published scale of all the evaluated studies. If the item 'Using stairs' is preferred, the scale from Volpicelli *et al*.[6] is the best to use. We think that this item is important because it is the highest achievement in indoors prosthetic use.

We found that a multitude of measurement scales and questionnaires are available but that they differ in methods and range of measurement. Several difficulties were faced:

1) There are difficulties in measurement. All items used were ordinal scaled. This implies that items in the scale stand in some kind of relation to each other. There is no true zero point and the intervals between the items are not equal. Most of the presently used disability and health status measures are of this type.[37] For comparison of the scales, a more or less arbitrary interval is chosen. It limits the possibility of testing and there is limited statistical analysis possible. In order to solve this problem we used in Table 2 a seven-class measure with a maximum range of measurement. In this way, we tried to give an accurate description and comparison of the individual studies. We realize that this is an effort to solve measurement problems and we made a compromise towards adjustments of the individual scales. A continuous measurement tool for mobility of the lower limb amputee is not available.
2) Functional mobility of lower limb amputees can differ because of the additional health status of the individual. Due to medical problems, mobility changes over time. One day a person may be able to walk with a stick and on another day a wheelchair may be needed because of physical or prosthetic problems. Measuring the mobility of an amputee is

Clinical messages

- Measurement scales of mobility of lower limb amputees differ considerably in range of measurement and are only partially comparable. We need to establish a mobility scale with a wide range of measurement, with enough detail to actually measure the differences over time. More precise measurement techniques need to be developed to give a proper comparison of mobility items.
- A real consensus about the use of mobility scales of lower limb amputees is not available in the recent literature.

therefore a sliding measurement over time. If a global division is made, as done by Russek[10] or Volpicelli *et al*.[6] with items such as 'household walker' and 'a community walker', it gives some idea of mobility but can hardly be compared with other studies. Burger *et al*.[25] studied the mobility of traumatic lower limb amputees and solved the problem by using a questionnaire but perceived the same problems as mentioned above.

3) Mobility measurements of walking speed and hours of prosthesis use are interesting data, but give no actual information about the mobility of the individual. Mobility without the use of a prosthesis is even more restricted and extensive use of a wheelchair is needed. Measurement in this context cannot be compared with results for walking amputees. Most easy to compare are those items related to walking aids but they are less informative about the total time of prosthetic use in mobility. Step counting, as used by Holden and Fernie,[44] gives information in a quantitative way but does not connect activity and mobility together.

Continuous measurement of mobility with a prosthesis, as developed by Stam *et al*.[45] and Bussmann and Stam,[46] can give additional information about mobility during activities. With measuring devices on the patient, they are able to detect changes in position of the body over time. In this way a ''continuous' mobility registration from bed, transfer, sitting and walking is possible, together with prosthetic and wheelchair use.

Measurement of movement in several directions can distinguish between making a transfer from bed and chair, sitting and walking. Comparable studies have been done by Kochersberger *et al*.,[47] but they could only distinguish between poor, moderate and good mobility in an elderly population.

In this article, we give an overview of the published mobility scales for lower limb amputee ambulation. We conclude that there is no adequate tool available for measuring mobility of lower limb amputees. There is no consensus about the ideal measurement scale and a number of authors have developed their own measurement system. The measurement system should have a wide range of measurement with enough detail to measure individual changes over time for the individual artificial limb user. The available studies cannot properly be compared. Therefore, we cannot select the most efficacious items and measurement scales for everyday rehabilitation treatment.

We need to establish a mobility scale with a wide range of measurement, with enough detail to actually measure the differences over time. The construct of a seven-class measurement scale is an effort to compare the studies in a more detailed way.

We conclude that in this study we found:

1) Thirty-five mobility scales for lower limb amputees. They differ considerably in range of measurement and are only partly comparable to each other.
2) Measuring mobility by a scale has been shown to have limitations. Several authors have done extensive research but they all measure only certain aspects of mobility.
3) The most frequently published mobility scale was the Stanmore Harold Wood mobility scale.[16]
4) None of the 35 studies presented give a continuous measurement of mobility. A continuous mobility registration instrument needs to be developed.
5) A real consensus about measurement of mobility of lower limb amputees is not available in the recent literature.

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